In the Matter of:)
Digital Audio Broadcasting   )
NRSC-5 Proposal standard for   )   MM Docket No. 99-325
IBOC   )

COMMENTS

Submitted by:
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JT Communications submits the following comments, and states:

PROPRIETARY IBOC SHOULD NOT BE UTILIZED

A proprietary system for IBOC should not be used...FCC should dictate the standard, and not leave the system criteria to a single organization. Restraint of trade and monopoly utilizing single company is paramount, and almost certain. Specialized licensing will be required by company; and should not be a permitted action by the FCC.

INSUFFICIENT AUDIO TESTING

USADR report submitted to NRSC did not include sufficient audio tests (only noise and separation). It did not include distortion, intermodulation or other slew-rate limited distortion effects of audio compression utilized. This will result in degraded audio performance to the proposed FM digital broadcast service.

DEGRADE IN AUDIO QUALITY WITH PROPOSED AUDIO ENCODING

Ibiquity's 96 kBpS lossy compression encode/decode rate for their proprietary encoding system will result in inferior audio performance, as compared to current analog FM broadcasting. Severe audio artifacts in will occur at this compression rate. Compromised audio will be the result of such compression.

Ibiquity's white paper entitled "IBOC FIELD TEST PLATFORMS" incorporated a piece of audio software by National Instruments "LabView". There is no report mentioned as it relates to audio performance measurements in comparison to analog FM transmissions.

IBOC system proponents alleged to the FCC that IBOC technology would provide near CD-quality sound on FM channels. It will not. Although this was the first of the FCC's ten (10) tentative selection criteria indicated in the NPRM, it has been totally ignored in all of the 'testing' conducted by the various agencies and organizations attempting to coerce the FCC into believing the superiority of IBOC.

Ibiquity's Perceptual Audio Coder (PAC) technology utilizes advanced signal processing and psycho-acoustic modeling to interpret human hearing and eliminate redundancies and irrelevancies in the audio signal. The current model utilized for the proposed IBOC transmissions will significantly degrade audio performance of FM broadcast stations. The result will be an inferior digital standard, with a significant compromise to the quality of FM transmission standards.

There exists improved compression standards over PAC, such as MPEG-2 layer 3 compression, which is both a worldwide industry accepted standard, and compatible with existing digital transmission standards. If incorporated with FM broadcast services, the minimum audio compression rate should be *no less than* 160 kB/s.

The audio encoding and decoding algorithm is not even mentioned in NRSC-5 documentation, but only briefly indicated in the Ibiquity white papers. Encoded audio is simply an input to the top of the IBOC stack and is not part of the NRSC-5 standard.

DIGITAL ODFM SIGNAL WILL CAUSE SIGINIFICANT INTERFERENCE IN GUARD BANDS

The signal architecture for an OFDM carrier system is defined in terms of the RF bandwidth (B), the number of subcarriers (N), and modulation index (m). The subcarriers are modulated independently with discrete Fourier transform (DFT) techniques and transmitted simultaneously.

The signal as seen in the time domain is not continuous; rather, it appears for a discrete interval which is a function of the bandwidth and the number of subcarriers as shown in Figure 4. The interval between successive signal

blocks is a guard interval during which interference from reflected and delayed signal components (multipath effects) is blocked at the receiver.

Figure 4. OFDM signal in time domain.
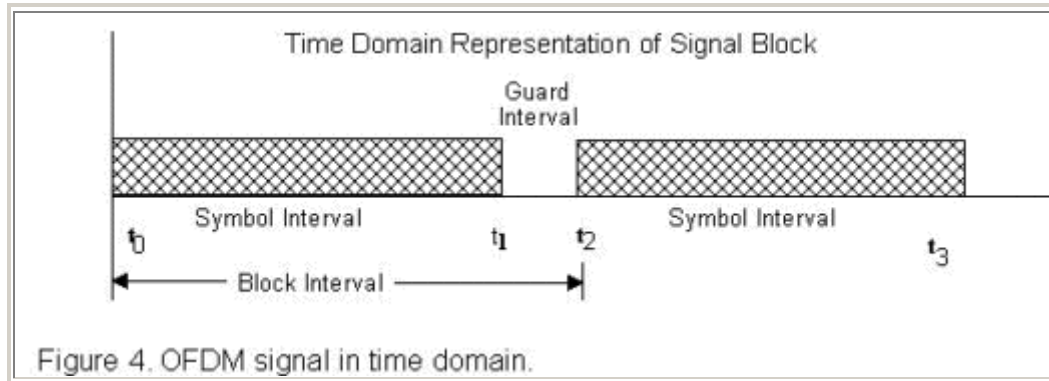
The OFDM signal architecture defines a block of symbols occurring at a designated rate. For a given channel bandwidth and number of subcarriers, the symbol interval, T_s (the interval between t_0 and t_1 in Figure 4), is determined. The block interval is the sum of T_s and the guard interval. The baud rate, in symbols/sec, is equal to the bandwidth, B. The aggregate data rate for the channel then, is m B. Each subcarrier in a block is modulated with either a QPSK or QAM format matched to m bits (modulation index). The total number of bytes in a block and the channel bit-rate for different values of B, N, and m can be determined.

In the Ibiquity white papers, no consideration is made for any guard-band constraints. It only assumes theoretical numbers, and not realistic conditions. If the Ibiquity signal is utilized, the amount of spurious signal generated from the ODFM signal will greatly exceed the FCC's current emission limitations of 73.317, 73,1590, and 73.1660.

RELOCATING DIGITAL BROADCASTING TO SEPARATE BAND

We support the idea of reallocating current TV channel 6 for the new digital FM broadcast band as an alternate means to deliver digital broadcasting to the FM services. These frequencies could be easily incorporated into the over 60 million current FM receivers in the US marketplace today. This would eliminate the need for current FM stations to bear additional expenses of being forced to purchase equipment for digital transitions that TV broadcasters are being forced to face. Additionally, consumers would not have to dispose of current receiver technology, but rather 'add-on' to existing technology for incorporation of a new band reserved for digital broadcasting. Interference issues currently encountered on the existing analog FM band would not be supplemented by additional (yet unforeseen) interference issues that would be encountered by IBOC proposals.

Respectively submitted,
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